IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent application of:

Applicant(s): Hung-Eil KIM
Serial No: 10/774,099
Filing Date: February 6, 2004
Title: MASK CD MEASUREMENT MONITOR OUTSIDE OF THE PELLICLE AREA
Examiner: John S. Ruggles
Art Unit: 1756
Docket No. AMDSPH1647US

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The undersigned submits this brief for the Board's consideration of the appeal of the Examiner's decision, mailed November 13, 2006, finally rejecting claims 1-15 of the above-identified application.

The fee for filing an appeal brief is being submitted concurrently herewith. In the event an additional fee is necessary, the Commissioner is authorized to charge any additional fee which may be required to Deposit Account No. 18-0988 under Docket No. AMDSPH1647US.

I. Real Party in Interest

The real party in interest in the present appeal is Advanced Micro Devices, Inc.

II. Related Appeals and Interferences

Neither appellant, appellant's legal representative, nor the assignee of the present application are aware of any appeals or interferences which will directly affect, which will be directly affected by, or which will have a bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 1-15 are pending in the application. Claims 1-15 stand finally rejected and are the subject of this appeal.

IV. Status of Amendments

On January 12, 2007, appellant filed an amendment after final amending claim 1. The amendment filed on January 12, 2007 was not entered. On February 9, 2007, appellant filed an amendment after final amending claims 1, 2, 5 and 6. The amendment filed on February 9, 2007 was entered.

V. Summary of Claimed Subject Matter

The following is a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, which refers to the specification by page and line number, and to the drawing by reference characters.

Claim 1

A method of fabricating a photomask 50 that facilitates accurate measurement of a critical dimension on the photomask comprises forming a first pattern 52 on a substrate 54 in a first area [4/25]; forming at least one test pattern 62 on the substrate 54 outside of the first area [4/28], wherein said at least one test pattern 62 is representative of the critical dimension on the photomask 50 [5/14]; and attaching a pellicle 56 to the substrate 50 [4/26], wherein the pellicle 56 covers the first area, but does not cover the at least one test pattern 62 [4/29].

Claim 7

A photomask 50 that facilitates accurate measurement of a critical dimension on the photomask comprises a substrate 54 [4/25]; a first pattern 52 formed on the substrate 50 [4/25]; at least one test pattern 62 formed on the substrate 50 [4/28], wherein said at least one test pattern 62 is representative of the critical dimension on the photomask 50 [5/14]; and a pellicle 56 attached to the substrate 50 [4/26], wherein the pellicle 56 is not attached over the at least one test pattern 62 [4/29].

Claim 13

A method of monitoring a critical dimension of a photomask 50 including a substrate 54 having a first pattern 52 in a first area [4/25], a test pattern 62 in a second area 64 outside of the first area [4/28], and a pellicle 56 attached to the substrate 50 which covers the first area but does not cover the second area 64 [4/26 and 4/29],

wherein a critical dimension of the test pattern 62 is similar in magnitude to a critical dimension of the first pattern 52 [5/14], comprises measuring the critical dimension of the test pattern 62 at a time when the pellicle 56 is attached to the substrate 50 5/16]; and estimating the critical dimension of the first pattern 52 based on the measuring step [5/19].

VI. Grounds of Objection/Rejection to Be Reviewed on Appeal

A. Claims 1, 5-7 and 11-12 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2002/0102477 to *Tanaka et al.* (referred to herein as "*Tanaka*").

B. Claims 2-4, 8-10 and 13-15 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tanaka* in view of U.S. Patent No. 6,812,999 to *Hickman* (referred to herein as "*Hickman*") and U.S. Patent No. 6,311,319 to *Tu et al.* (referred to herein as "*Tu*").

VII. Argument

The rejections advanced by the Examiner are improper and should be reversed for at least the following reasons.

Background

In the semi-conductor chip industry it is well known that pattern transfer from a photomask (hereinafter referred to as a mask) to a substrate is accomplished by

exposing the mask to a light source. During the pattern transfer process, also called the photolithographic process, patterns on the mask are projected onto the substrate, which has been treated with a photosensitive substance. This results in mask etchings being reproduced onto the substrate. Unfortunately, any foreign substance on the surface of the mask also will be reproduced on the substrate and therefore will interfere with proper pattern transfer to the substrate.

To eliminate contamination of the mask surface, a pellicle is mounted on the mask surface. A pellicle is a thin (~1 μm) polymer film stretched across a frame that is attached to the mask. Particles deposited on the pelliclized mask fall onto the pellicle or glass backside of the mask, and therefore are several millimeters away from the features that are being imaged. With small depths-of-field, these particles will not be in focus and thus will not interfere with pattern transfer.[1]

Despite precautions that are taken to prevent damage to the mask, it still is necessary to periodically check the mask in order to assure that the pattern projected through the mask is the same as the desired pattern. Patterns on the masks must meet stringent criteria for size, shape, spacing, orientation, overlap, and placement of features.

Generally, the inspection includes measuring the mask CD using an electron beam CD measurement tool. Since the pattern on the mask to be measured is behind the pellicle, the pellicle is removed before the measurement is made to increase the accuracy of the measurement.

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[1] Page 1, lines 10-25 of the application as filed.

A drawback of the present method for inspecting pelliclized masks is that before the inspection can be performed the pellicle must be removed. Pellicle removal can lead to several problems. For example, the mask can be damaged during the removal and/or reinstallation of the pellicle. Additionally, the removal and installation of the pellicle requires a certain amount of time, thereby adding to the cost of ownership of the mask. Furthermore, material costs associated with a new pellicle also are a factor in the cost of ownership of the mask.[2]

Summary of the Claimed Subject Matter

With reference to the application drawings, a mask includes a mask pattern formed on a substrate. A pellicle spans over the mask pattern and includes a pellicle frame attached to the substrate, and a transparent film stretched across the pellicle frame. Additionally, one or more critical dimension (CD) test patterns are formed on the substrate in an area outside of the pellicle. The test patterns outside of the pellicle (as defined by the pellicle frame) are not covered by the pellicle and, therefore, can be easily measured to determine the mask CD.

The test patterns preferably are created during the formation of the mask pattern and thus are formed at substantially the same time and under the same or similar conditions as the mask pattern, e.g., the same environment, dose, mask writer, etc. Additionally, the test patterns preferably include patterns typical of the mask pattern. For example, mask patterns often require optical proximity correction due to proximity

[2] Page 2, lines 8-25 of the application as filed.

effects, i.e., image shape distortion where features with the same nominal CD print differently due to environmental variations. Alternatively, a portion of the mask pattern can be duplicated as the test pattern.

Accordingly, the test patterns provide an accurate representation of the mask pattern for purposes of determining mask CD, e.g., the test pattern CD is similar in magnitude to the mask pattern CD. Moreover, since the pellicle does not cover the test patterns, accurate measurements of the test pattern CD can be made using an electron beam CD measurement tool or the like without removing the pellicle. Thus, the mask CD can be estimated accurately from the test pattern CD measurement. Additionally, the mask CD can be obtained in less time as compared to prior art methods of obtaining mask CD. Furthermore, the likelihood of damaging a mask due to pellicle removal/installation and the associated costs are effectively eliminated, since the mask CD can be measured without removing the pellicle.[3]

A. Rejection of Claims 1, 5-7 and 11-12 under 35 U.S.C. § 103(a)

Claims 1, 5-7 and 11-12 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tanaka*. The Examiner's remarks in support of the rejection are as follows:

> Re claims 1, 5-7 and 11-12, *Tanaka* teaches masks and methods of making them. In Fig. 1 (mask A having an attenuating material surface) and Fig. 2 (mask B having a transparent glass surface), GP is a glass plate substrate, PA is a circuit pattern area centrally located inside a

[3] Page 4, line 24-page 5, line 24 of the application as filed.

pellicle frame 1g, each 1a is a (first) circuit pattern, 1b a wafer alignment mark transferred onto a semiconductor wafer, 1c a reticle alignment mark, 1d a bar code (mark for discrimination) for mask management, 1e a discrimination mark for mask management, 1f a base line adjustment pattern which corrects aging of focusing and position alignment, 1h a critical dimension (CD) monitor pattern, 1i a pattern displacement monitor pattern, 1j a phase angle monitor mark of a half-tone phase shift mask, and 1k another base line adjustment pattern. In each of Figs 1 and 2, the reticle alignment marks 1c, the bar code pattern 1d, the discrimination mark 1e, and the base line adjustment patterns 1f and 1k are all test patterns positioned on the mask outside the pellicle frame 1g (so at least these patterns are not covered by the pellicle attached by pellicle frame 1g to the mask substrate). At least the CD monitor pattern 1h is expected to enable the mask to facilitate accurate measurement of a CD on the mask. While Figs. 1 and 2 show plural CD monitor patterns 1h as being position inside the pellicle frame 1g, it is merely a matter of design choice whether to place a CD monitor pattern inside or outside the pellicle frame. In fact, it would have been obvious to one of ordinary skill in the art to place the CD monitor pattern outside the pellicle frame, at least because most of the other test patterns on the masks exemplified by Figs. 1 and 2 are already positioned outside the pellicle frame 1g.

Claims 1, and 7

Claim 1 recites a method of fabricating a photomask that includes forming at least one test pattern representative of a critical dimension on the photomask on an area of a substrate, and attaching a pellicle to the substrate such that the pellicle does not cover the at least one test pattern. Claim 7 recites a photomask that includes at

least one test pattern representative of a critical dimension of the photomask, and a pellicle, wherein the pellicle is not attached over the at least one test pattern.

Tanaka discloses a photomask that includes, *inter alia*, a reticle alignment mark, a bar code, and a discrimination mark, each of which is located outside a pellicle area of the photomask. As was known at the time *Tanaka* was filed, such marks are used for mask management (e.g., names of masks, lot numbers, etc.).[4] In general, light having a wavelength longer than 240 nm was used to monitor the alignment marks and discriminators. However, it was found that general resist material was unable to obtain sufficient shield properties for light having wavelength longer than 230 nm. As a result, when alignment marks or discriminators are formed of resists, shielding properties and light-absorbing properties are so inefficient that discrimination, recognition or monitoring is made difficult.[5] To address this issue, *Tanaka* describes a semiconductor device manufacturing method in which a circuit pattern, an alignment mark, and a discrimination mark are formed on a photomask and are constituted of the same photo sensitive and photo attenuative material.[6]

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[4] See paragraph [0010] of *Tanaka*.

[5] See paragraph [0010] of *Tanaka*.

[6] See paragraph [0018] of *Tanaka*.

Location of Test Pattern is not a Design Choice

a. Tanaka does not teach a CD monitor pattern outside the pellicle

Figs. 1 and 2 of *Tanaka* (reproduced below) show photomasks A and B that include a critical dimension (CD) monitor pattern 1h formed within a pellicle frame 1g, and a bar code 1d, reticle alignment mark 1c, baseline adjustment pattern 1k and discriminator 1e formed outside the pellicle frame 1g. As is clear from Figs. 1 and 2 of *Tonaka* as well as the Examiner's admission as noted above, *Tanaka* does not teach that the CD monitor pattern 1h is positioned in an area not covered by the pellicle (e.g., outside the pellicle frame 1g in Figs. 1 and 2). However, the Examiner asserts that locating the CD monitor pattern 1h outside the pellicle area is merely a matter of design choice, and that it would have been obvious to one having ordinary skill in the art to place the CD monitor pattern 1h outside the pellicle frame 1g. Appellant respectfully disagrees with the Examiner.

FIG.1

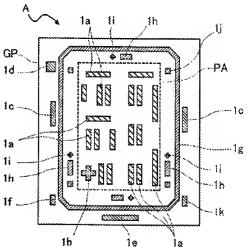
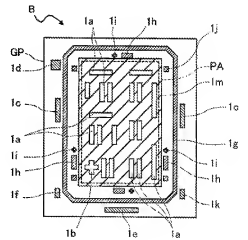


FIG.2



b. The mere fact that the prior art can be modified as suggested by the Examiner does not support a finding that the modification is a design choice

"The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification". *In re Fritch*, 972 F.2d 1260, 1266 n.14, 23 USPQ2d 1780, 1783-84 n.14 (Fed. Cir.1992).

Further, §2144.04(VI)(C) of the MPEP, which relates to the rearrangement of parts, states

> The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. *The prior art must provide a motivation or reason for the worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device.* (Emphasis added)

In rejecting claim 1, the Examiner only cites to a single reference that teaches conventional photomasks, wherein a CD monitoring pattern is located in an area covered by the pellicle. The Examiner provides no prior art evidence that one skilled in the art would be motivated to move the CD monitor pattern 1h to an area not covered by the pellicle, and instead simply uses the rational that one would move the CD pattern to an area not covered by the pellicle because other features are positioned outside the pellicle frame.

c. The features located outside the pellicle are used for a substantially different purpose than the CD monitor pattern located inside the pellicle

While *Tanaka* does teach that features may be placed outside the pellicle frame, such features pertain to alignment and identification of the mask (i.e., reticle alignment mark 1c, discrimination mark 1e, baseline adjustment patterns 1f and 1k, and bar code 1d). None of these features pertain to measuring a critical dimension of the mask.

For measuring a critical dimension of the mask, *Tanaka* specifically discloses a CD monitor pattern 1h that is formed **in an area of the mask that is under the pellicle** (e.g., within the pellicle frame 1g of Figs. 1 and 2 of *Tanaka*). Further, the purpose of the CD monitor pattern 1h (i.e., to monitor a critical dimension of the mask) is unrelated to the purpose of the features located outside the pellicle frame (i.e., to align, identify and manage). In other words, the CD monitor pattern 1h is not functionally related to the features located outside the pellicle frame 1g. As a result, one skilled in the art would not be motivated to locate the CD monitor pattern 1h outside the pellicle frame 1g simply because these other features are located outside the pellicle frame, as contended by the Examiner. Instead, one skilled in the art would recognize that the CD monitor pattern is used for a substantially difference purpose (i.e., monitoring a critical dimension of the mask) relative to the purpose of the bar code, discrimination and alignment marks (i.e., for mask management). More specifically, monitoring a critical dimension requires very precise measurements of the monitored features using very precise equipment. In contrast, and as discussed in more detail below, the degree of precision associated with the use of the bar code, discrimination marks and alignment

marks is on a completely different level than that used for measurement of the critical dimension.

Moreover, regarding the Examiner's statement that it would have been obvious to one of ordinary skill in the art to place the CD monitor pattern outside the pellicle frame, at least because most of the other test patterns on the masks exemplified by Figs. 1 and 2 are already positioned outside the pellicle frame 1g,[7] the mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. The Examiner has not provided any prior art that suggests this desirability. Simply stating that other patterns, which have a completely different purpose from the CD monitor pattern, are located outside the pellicle frame does not establish the desirability of moving the CD monitor pattern outside the pellicle frame. Whether the changes from the prior art are "minor", the changes must be evaluated in terms of the whole invention, including whether the prior art provides any teaching or suggestion to one of ordinary skill in the art to make the changes that would produce the patentee's device. *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d, 931, 15 USPQ2d, 1321 (Fed Cir. 1990). This includes what could be characterized as simple changes. *In re Gordan*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) (although a prior art device could have been turned upside down, that did not make the modification obvious unless the prior art fairly suggested the desirability of turning the device upside down).

[7] Page 7 of the Office Action dated November 13, 2006.

Further, in the Advisory Action dated January 26, 2007, the Examiner, in addressing the obviousness rejections, states that placement of the CD monitor pattern outside the pellicle on the mask would result in the same advantages that are known to those of ordinary skill in the art for locating other testing patterns of the same material outside the pellicle as taught by *Tanaka* (e.g., the *same testing equipment can be used for all of the testing patterns, including the CD monitor*, outside the pellicle without impinging on the pellicle, to avoid causing pellicle damage or distortion in the measured CD monitor pattern if the CD monitor pattern were located underneath the pellicle) (emphasis added).

Initially, it is noted that analysis of the CD monitor pattern is conventionally performed using an electron beam CD measurement tool.[8] As is well known, the ability to measure critical dimensions (CDs) of structures on wafers is key to lithographic and etch tool characterization and a cornerstone of good process control.

By way of background, prior to the early '80's, line widths were mostly measured with optical microscopes, where CDs were calculated by analyzing the intensity of reflected light. As dimensions shrank, the industry moved to the scanning electron microscope (SEM), where CDs are calculated by analyzing secondary electrons. Today, SEMs remain the technique of choice for measuring CDs.

In contrast, *Tanaka*, in discussing the discrimination mark 1e and bar code 1d, states that "since the pattern itself is not so small, expensive short-wavelength systems need not be used". In other words, and contrary to the Examiner's assertion, *Tanaka*

[8] See, e.g., page 2, lines 15-16 of the application.

clearly suggests that one advantage of *Tonaka's* invention is that less precise (and therefore less expensive) equipment may be used to read the discrimination mark and the bar code.[9] Such "less expensive" equipment would not be an electron beam CD measurement tool.

The Examiner's conclusion that locating the CD monitor pattern outside the pellicle area would have been obvious matter of design choice in view of the prior art to *Tonaka* is unfounded. The Examiner has not advanced any evidence to this effect, and it would appear that the only suggestion for modifying the prior art images to arrive at those set forth in the claims stems from hindsight knowledge impermissibly derived from the appellants' disclosure. As is well settled, obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor. *Para-Ordnance Mfg. Inc. v. SGS Importers Int'l Inc.*, 73 F.3d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir.1995). The Examiner has not articulated a reasonable motivation, based on the teachings of the prior art, for moving the CD monitor pattern 1h to an area not covered by the pellicle. Clearly, such a rejection is improper.

Absent some teaching in the prior art that at least one test pattern representative of a critical dimension of a photomask is located in an area not covered by a pellicle, or some reasonable motivation to modify the prior art so as to render claims 1, 7 and 13, the present rejection must be withdrawn.

[9] See paragraph [0086] of Tanaka.

Simplicity is not a Bar to Patentability

The present invention may be considered by some as a "simple invention". In a variety of contexts, however, the courts have ruled that the obviousness of a new product is not to be judged solely by the structural modification or difference from the products of the prior art. See D. Chism, Patents, Section 5.04[7]. Indeed, an invention's simplicity may support a conclusion of unobviousness. See, e.g., *Globe Linings, Inc. v. City of Corvallis*, 555 F.2d 727 (9th Cir., 1977) (an inventor will not be denied a patent simply because his invention embodies a solution which seems simple and obvious with the benefit of hindsight), *In re Sporck*, 301 F.2d 686 (CCPA 1962) (the simplicity of new inventions is often times the very thing that is not obvious before they are made), and *Van Veen v. United States*, 286 F.2d 462 (Ct. Cl. 1967) (experience has shown that some of the simplest advances have been the most nonobvious).

In view of the above, reversal of the rejection of claims 1 and 7 is respectfully requested.

Claims 5-6 and 11-12 depend from claim 1 or claim 7 and, therefore, can be distinguished from *Tanaka* for at least the same reasons.

Accordingly, reversal of the rejection of claims 5-6 and 11-12 is respectfully requested.

Claim 13

Claim 13 recites a method of monitoring a critical dimension of a photomask including a substrate having a first pattern in a first area, a test pattern in a second area

outside of the first area, and a pellicle attached to the substrate which covers the first area but does not cover the second area, wherein a critical dimension of the test pattern is similar in magnitude to a critical dimension of the first pattern. The method includes measuring the critical dimension of the test pattern at a time when the pellicle is attached to the substrate; and estimating the critical dimension of the first pattern based on the measuring step.

The Examiner rejects claim 13 based on the same art as claims 1 and 7. However, it is noted that none of the references have been shown to perform the steps of claim 13. More specifically, the Examiner has not shown where the references teach the steps of *measuring a critical dimension of the test pattern at the time when the pellicle is attached to the substrate*, and *estimating the critical dimension of the first pattern based on the measuring step*.

Accordingly, reversal of the rejection of claim 13 is respectfully requested.

B. Rejection of Claims 2-4, 8-10 and 13-15 under 35 U.S.C. § 103(a)

Claims 2-4, 8-10 and 13-15 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tanaka* in view of *Hickman* and in further view of *Tu*. Reversal of the rejection is respectfully requested for at least the following reasons.

Claims 2 and 8

Claim 2 depends from claim 1 and further recites that forming the at least one test pattern includes duplicating *a portion of the first pattern as the at least one test*

pattern. Claim 8 depends from claim 7 and recites that the *at least one test pattern is derived from a portion of the first pattern*.

The Examiner states that *Hickman* teaches methods of correcting exposure defects, and refers to Fig. 4 of *Hickman* as well as column 5, lines 3, and 26-31 and column 4, lines 16-19 of *Hickman*.

While *Hickman* does discuss methods of using a corrective filter to correct a defect in a reticle, this filter is used during the imaging process (i.e., during transfer of the pattern onto a substrate). The cited portions make no mention of *a test pattern representative of a critical dimension on the photomask including at least a portion of the first pattern*. As is well known, a critical dimension of a photomask is determined by measuring features on the mask itself, and not based on images that may be produced by the mask (e.g., by measuring the actual mask pattern or a CD test pattern via an electron beam measuring tool). *Hickman* simply has not been shown to teach *duplicating a portion of the first pattern as the at least one test pattern* as recited in claim 2, or *at least one test pattern is derived from a portion of the first pattern* as recited in claim 8.

Similarly, *Tu* discloses applying optical proximity correction (OPC) to improve imaging. In support of the rejection, the Examiner cites to column 2, lines 53-55 and column 1, lines 41-52 of *Tu*. Like *Hickman* above, however, the cited portion of *Tu* makes no mention of the features of claims 2 and 8.

Thus, the Examiner has not shown each of the claimed features in the cited art. Accordingly, reversal of the rejection of claims 2 and 8 is respectfully requested.

Claims 3, 4, 9 and 10

Claim 3 depends from claim 1 and further recites that duplicating a portion of the at least one test pattern includes *using optical proximity correction in the at least one test pattern* (e.g., the features of the test pattern include features used in optical proximity correction). Such optical proximity correction features may be typical of the first pattern from which the test pattern is derived. Claim 9 depends from claim 7 and further recites that the at least one test pattern includes optical proximity correction.

As noted above with respect to claims 2 and 8, *Hickman* discusses methods of using corrective filters to correct a defect in a reticle, while *Tu* discusses the use of OPC to improve imaging. Correcting or preventing exposure defects and improving imaging, however, are not discussed with respect to the creation of a CD test pattern that is used to measure a CD of the photomask. Instead, they are discussed with respect to the actual patterns that are used to transfer an image onto an area. Since the CD test pattern itself is not intended to be transferred onto the area (or if it is, the actual patterned image is not important), discussion of such techniques is not applicable to the creation of a CD test pattern.

Thus, the Examiner has not shown each of the claimed features in the cited art. Accordingly, reversal of the rejection of claims 3, 4, 9 and 10 is respectfully requested.

Claims 14 and 15

Claims 14 and 15 depend from claims 1 and 7, respectively, and further recite that the *at least one test pattern includes patterns typical of the first pattern*.

As noted above, *Hickman* does discuss methods of using a corrective filter. However, the cited portions of *Hickman* make no mention of *at least one test pattern including patterns typical of the first pattern*. The same also applies to *Tu*. The cited portions of *Tu*, while discussing OPC with respect to improving imaging, make no mention of *at least one test pattern including patterns typical of the first pattern*.

Thus, the Examiner has not shown each of the claimed features in the cited art. Accordingly, reversal of the rejection of claims 14 and 15 is respectfully requested.

VIII. Conclusion

In view of the foregoing, it is respectfully submitted that the claims are patentable over the applied art and that the rejections advance by the Examiner should be reversed.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR, L.L.P.

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__/Kenneth W. Fafrak/___ **April 9, 2007**

Claims Appendix

1. A method of fabricating a photomask that facilitates accurate measurement of a critical dimension on the photomask, comprising:

forming a first pattern on a substrate in a first area;

forming at least one test pattern on the substrate outside of the first area, wherein said at least one test pattern is representative of the critical dimension on the photomask; and

attaching a pellicle to the substrate, wherein the pellicle covers the first area, but does not cover the at least one test pattern.

2. The method of claim 1, wherein forming at least one test pattern includes duplicating a portion of the first pattern as the at least one test pattern.

3. The method of claim 2, wherein duplicating a portion of the first pattern as the at least one test pattern includes using optical proximity correction in the at least one test pattern.

4. The method of claim 3, wherein using optical proximity correction includes using shapes selected from the group consisting of serifs, hammerheads and scattering bars.

5. The method of claim 1, wherein forming the first pattern and forming the at least one test pattern include forming the first pattern and the at least one test pattern substantially simultaneously on the substrate.

6. The method of claim 1, wherein forming the first pattern and forming the at least one test pattern include forming the first pattern and the at least one test pattern under substantially the same conditions.

7. A photomask that facilitates accurate measurement of a critical dimension on the photomask, comprising:

a substrate;

a first pattern formed on the substrate;

at least one test pattern formed on the substrate, wherein said at least one test pattern is representative of the critical dimension on the photomask; and

a pellicle attached to the substrate, wherein the pellicle is not attached over the at least one test pattern.

8. The photomask of claim 7, wherein the at least one test pattern is derived from a portion of the first pattern.

9. The photomask of claim 7, wherein the at least one test pattern includes optical proximity correction.

10. The photomask of claim 9, wherein the optical proximity correction includes shapes selected from the group consisting of serifs, hammerheads and scattering bars.

11. The photomask of claim 7, wherein the photomask is a binary chrome-on-glass mask.

12. The photomask of claim 7, wherein the photomask is a phase shifting mask.

13. A method of monitoring a critical dimension of a photomask including a substrate having a first pattern in a first area, a test pattern in a second area outside of the first area, and a pellicle attached to the substrate which covers the first area but does not cover the second area, wherein a critical dimension of the test pattern is similar in magnitude to a critical dimension of the first pattern, the method comprising:

measuring the critical dimension of the test pattern at a time when the pellicle is attached to the substrate; and

estimating the critical dimension of the first pattern based on the measuring step.

14. The method of claim 1, wherein the at least one test pattern includes patterns typical of the first pattern.

15. The photomask of claim 7, wherein the at least one test pattern includes patterns typical of the first pattern.

Evidence Appendix

None.

Related Proceedings Appendix

None.